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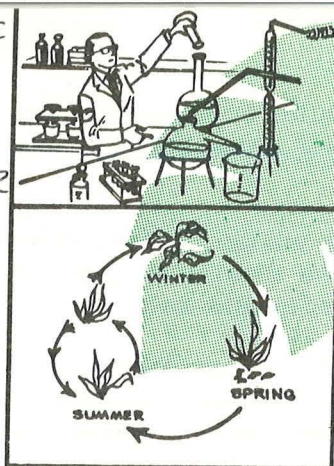
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(Revised)

PLANT DISEASES

JOHN L. WEIHING

Extension Plant Pathologist

Soil Treatments for Damping-off and Nematode Control..

Young seedlings are frequently subject to infection by certain soil-borne fungi, causing them to wilt, fall over and die. This type of disease is called "damping-off." It is particularly common in greenhouse flats, benches, pots, hotbeds and home indoor plantings.

Sometimes the soil in the garden will become infested with microscopic worm-like organisms called nematodes capable of attacking plant roots, causing swellings or causing roots to die. Such infested plants are inferior in size and vigor and may degenerate until death.

In general, there are three types of compounds employed for damping-off and nematode control: (1) fungicides for damping-off, (2) nematicides for nematodes and (3) soil sterilants which kill both fungi and nematodes.

FUNGICIDES FOR DAMPING-OFF

Dexon - A wettable powder which has given excellent control of a number of damping-off organisms. Apply as suggested by manufacturer.

PCNB - (trade name - TERRACLOR) - A wettable powder which is applied to the soil for certain damping-off diseases. Apply as suggested by manufacturer.

DEXON-TERRACLOR - This particular combination has given excellent control of damping-off organisms. Apply as suggested by manufacturer.

PANOGEN SOIL DRENCH - A liquid whose active ingredient is the same as the cereal seed treatment product "Panogen" which has been recommended for many years.

SEMESAN - This is a liquid organic mercury which should be applied as a drench. Use 1 level teaspoonful per gallon of water and apply this solution with a sprinkling can at the rate of 3 pints per 10 square feet. The soil should be loose, dry and level. Planting may be done as soon as the soil is sufficiently dry.

CAPTAN, MANEB or ZINEB - Where one of the above listed damping-off fungicides is not available, the standard foliar fungicides, Captan, Maneb or Zineb can be used with satisfactory results. Use 1 level tablespoonful of any one of the fungicides per gallon of water and apply this solution with a sprinkling can at the rate of 3 pints per 10 square feet. The soil should be loose, dry and level. Planting may be done as soon as the soil is sufficiently dry.

NEMATICIDES

The nematicide chemicals, when placed in the soil, will volatilize and fumigate the soil. The first nematicides produced could not be used safely around growing plants, but in recent years a product has been developed which can. There are a number of different fumigants, some of which require special application equipment. Only those suited to the needs of the home gardener will be mentioned below.

A) Chemicals that CAN be used around growing plants, if manufacturer's recommendations are followed closely.

<u>Chemical</u>	<u>Various trade names</u>
1, 2 Dibromo-3 Chloropropane	Fumazone, Nemagon

This particular chemical is a liquid soil fumigant that can be used in preplanting, at-planting or post-planting

applications. It is unique in its lack of toxicity to many plants.

Fumazone and Nemagon can be applied in irrigation water and are recommended for use in flood and furrow irrigation. The manufacturer has written directions for their application.

B) Chemicals that CANNOT be used around growing plants but must be applied before planting.

<u>Chemical</u>	<u>Various trade names</u>
Ethylene dibromide (EDB-85)	Dowfume W-85, Soilfume- 85
Dichloropropane-di- chloropropene (DD)	DD, Vidden D
1, 3 Dichloropropane (DCP)	Telone, Dorlone

These particular chemicals are sold as liquids. Ethylene dibromide also can be obtained in capsules under the trade name "soilfume caps," each capsule containing one-half cubic centimeter of pure chemical.

Preparing the land: First, spade (or plow) and rake the soil to seedbed tilth. Be sure to remove any undecayed roots of the preceding season.

Soil temperature: Soil temperature should not be lower than 40°F and not higher than 80°F. when application is made. Take the temperature of the soil six inches below the surface.

Methods of application: There are two ways that the chemical may be conveniently applied:

1. The furrow method.

- a. With a hoe make furrows in the soil 12 inches apart and 6 to 8 inches deep. A fruit jar with two nail holes punched in opposite sides of the metal caps

makes a suitable applicator. Fill with chemical and recap the jar. Now walk along the furrow dribbling the chemical in the bottom of the furrow. After application of not more than 100 feet, stop, rake over and cover the furrow. Pack the soil lightly to help seal the gas in the soil.

b. The amounts to apply:

EDB-85 - 1/4 pint per 150 to 170 linear feet of row.

DD - One pint per 150 to 170 linear feet of row.

DCP - 3/4 pint per 150 to 170 linear feet of row.

c. Now wait at least two weeks before planting anything in the ground since these chemicals are toxic to plants and germinating seeds. If the temperature during this two weeks waiting period is low (below 60°F) or if there has been excessive rain, the time lapse should be increased to three weeks.

2. The spot method.

a. Prepare ground as outlined above under 1, a.

b. Punch small holes to a depth of 6 to 8 inches each 12 inches apart over the area to be fumigated.

c. Place one EDB fumigant capsule in each hole and cover immediately with soil.

d. Wait at least two to three weeks before planting.

SOIL STERILANTS

Formaldehyde - Where large amounts of soil are to be sterilized, formaldehyde may be used at the rate of one gallon to 50 gallons of water. This solution should be applied at a rate of one-gallon to a square foot of soil surface.

After treating, the soil should be covered with a wet tarpaulin or sacks for 24 hours or more. After this the soil should be turned over once or twice to let the gas

escape. Do not plant seeds or plants in such soil until it has been aired out for at least 24 hours.

For small amounts of soil use two and one-half tablespoons of commercial formaldehyde for each bushel of soil. This formaldehyde should be mixed with five or six times as much water, sprinkled over the soil, and then mixed in well.

Such soil should be put in a covered airtight box or can and allowed to stand for 24 hours. Then air out the soil until all odor of formaldehyde has disappeared before seeding or setting plants in it.

Chloropicrin - Chloropicrin (sold under the trade name Larvacide) is commonly known as tear gas. It is dangerous to use and a gas mask should be worn while working with it.

Success with this type of soil treatment depends especially upon the following four points: (1) good loose friable soil, (2) fairly high soil temperatures (68°F or higher,) (3) moderate soil moisture (when soil will hold its shape when squeezed in the hand,) and (4) proper application.

An applicator which automatically deposits a measured quantity of the chloropicrin when the tip is inserted in the soil is made by the company selling this chemical. Parallel marks 10 inches apart are made the length of the beds and an injection of 2 cubic milliliters of the liquid is made every 9 inches along these marks.

It is necessary to sprinkle the treated area promptly with water to retain the gas. The soil must stand 10 to 15 days before planting or until no odor of the gas can be detected on digging.

Vapam: (Sodium N-methyl dithiocarbamate - anhydrous 30%) - The soil should be fairly fine and of sufficient moisture content to insure maximum gas penetration and weed germination. These conditions should be maintained for at least 5 days prior to treating. The soil temperature should be from 50° to 75°F. or above.

For clay soils use a dosage of 1 1/2 to 2 quarts per 100 sq. ft. For light and medium textured soils, the basic dosage is 1 qt. per 100 sq. ft.

When applying Vapam sprinkle it uniformly over the soil surface in 1 to 3 gallons of water per 100 sq. ft. If possible, have another person following immediately with a roto-tiller. If the application is being made alone, do not treat more than 100 sq. ft. at a time before applying a water seal to the upper one inch of treated soil. When the top treated soil has dried sufficiently, cultivate it 1 to 2 inches deep. Do not plant until 2 to 3 weeks after treating.

Mylone - (85% dimethyltetrahydro - 1, 3, 5, 2H-thiadiazine-2-thione). A relatively new soil fumigant.

Follow manufacturer's directions and recommendations.

Methyl bromide - This chemical is a superior soil sterilant. It is sold as a liquid in pressure containers but becomes a gas when released in temperatures above 39°F.

Because it is such a highly volatile and toxic material, it should be applied by a competent custom operator or under the supervision of a technical person. It is not advised that application be attempted by the average home owner.

Heat - Heat is a good soil sterilant. In the home where only a few pots of soil need to be sterilized, you can do this in an oven or pressure cooker. Heating moist soil in the oven at least 180°F for 1/2 to one hour or in a pressure cooker for 10 minutes at 15 lbs pressure is sufficient.

Observe these Precautions

Fumigant and sterilant chemicals are poisonous. READ THE DIRECTIONS ON THE LABEL AND FOLLOW THEM AT ALL TIMES. Avoid breathing the vapors. These chemicals cause burns if allowed to stay on the skin. Remove immediately by washing with lots of soap and water.

Clothing and shoes which have been spilled upon should be removed and thoroughly cleaned before being worn again.